

Abstract Submitted
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Elliptical-Like Orbits on a Spandex Surface DANNY WELLER,
CHAD MIDDLETON, Colorado Mesa University — Planets move in elliptical orbits with the Sun stationed at one of the ellipses' foci, as described by Kepler's 1st law. Recreating these elliptical orbits on a cylindrically symmetric surface in a uniform gravitational field has been shown to be impossible for the general case. The purpose of this project is to analyze elliptical-like orbits on a cylindrically symmetric spandex fabric. Securing a piece of spandex to a circular trampoline frame and placing a central mass on it, the fabric takes the shape of minimal energy, which can be understood by using the calculus of variations method. Using a marble one can produce elliptical-like orbits around the central mass. Lagrangian dynamics is used to theoretically describe the motion of a marble on the surface. For elliptical-like orbits with small eccentricities, we arrive at an approximate solution for the precession parameter in the small and large curvature regimes.

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